Point Reyes National Seashore
Contraception Program 2000

Contents:

Summary

The 2000 contraceptive boostering season at PORE began on July 11 and ended on August 31. This was the fourth year of the program at Tomales Point, and the first year the program was administered and coordinated by PORE staff. Animals boostered this year were captured and given their primary inoculations of porcine Zona Pellucida (pZP) in the summers of 1997 and 1998.

This year's program involved more than 20 people including PORE Resource Management and Ranger personnel, Morgan Horse Ranch staff and volunteers, and U.C. Davis researchers. One to four horses per boostering day were used. Boostering took place over 25 days during which 43 elk cows were darted in the hindlimb or back using 1 cc. darts containing 65 μg. of pZP and 0.5 cc. of Freund's Incomplete Adjuvant (Table 1). Two targets animals were not boostered before the program was terminated on August 31; one because the collar was unreadable (OOG) and one because she was severely lame and seemed unlikely to survive more than 4 months (OYB). Six previously contracepted animals were not boostered this year in keeping with the U.C. Davis research protocol.

The program was successful in large part because of commitment and dedicated effort on the part of PORE Resource Management, Law Enforcement, Interpretation and Administrative staff. This year's boostering could not have taken place without the generous help of Morgan Horse Ranch and elk program volunteers.

Methods

Daily boostering at Tomales Point involved 1-2 teams assigned to either the north or south ends of the elk reserve. Each team included one shooter and one horse and rider to lead the shooter close to the target animal(s). Two Pneu-Dart® rifles and occasionally, a

Dan-Inject® CO2 pistol were used for darting at 25-45 yards (see Appendix 1 for protocol). Data sheets were filled out for each boostered animal with information on date and time, shooter's initials, presence or absence of a calf, location of dart hit, whether dart was retrieved and had discharged, and any perceived problems. Darters were all trained in wildlife capture and handling with the exception of one shooter who darted only when capture-trained staff stood by.

Safety

There were no accidents involving staff, volunteers, visitors or horses during this year's boostering.

One cow (GBO) probably only received one half of the 65 μg. pZP dose. There were 3 instances in which darts struck elk in suboptimal areas, once in a hock (YOR) and once in the flank (RGO). In another instance, bone was found lodged inside the dart after retrieval (YGO). In all three cases, animals were subsequently observed to be behaving normally. One animal (ROG) was darted twice with full doses of pZP. Information on the health of boostered animals will be collected at least weekly throughout the year by elk management staff and interns.

Only one abscess was observed at a year 2000 injection site, two weeks after darting. Several older abscesses from previous darting seasons have been observed and documented. Since May 1999, when regular observations by PORE staff began at Tomales Point, 9 abscesses have been noted in contracepted animals. The observed swellings, although not definitively caused by darting, were all in target areas of the hindquarters and suggest an abscess rate of about 15% for the duration of the program. Abscesses that occurred before 1999 are sporadically documented in PORE records and smaller, deeper abscesses have probably been missed. The true rate of abscess formation secondary to contraceptive darting is unknown but likely higher than 15%.

Darts were retrieved 28 times after the 43 successful shots (65% of the time). Unsuccessful shots were not documented on data sheets and lost darts from missed shots, of which there were at least 20, would indicate more than 35 unretrieved, potentially "live" darts at Tomales Point. Most of these lost darts probably discharged upon impact with the ground and are located in remote, off-trail areas of the elk reserve. However, they still constitute a risk to wildlife and visitors.

Drug Storage

On July 18, approximately 50 doses of pZP were found defrosted and unrefrigerated. It is unknown how long they had been out of the freezer. After consultation with Dr. Irwin Liu of U.C. Davis and Dr. Jay Kirkpatrick of ZooMontana, a new, frozen batch of pZP was ordered and the first batch of defrosted pZP was refrozen. In order to avoid a pause in the boostering program, 9 of the 42 boostered cows were inoculated with the defrosted (first batch) pZP. This information is included in the Access contraception database.

Visitors and Interpretation

A sign describing the contraceptive program was posted at the Tomales Point trailhead. Most visitors appeared curious about the program and supportive of it once details were explained. There were no negative comments communicated to boostering staff. In general, visitors accommodated boostering teams by not lingering in areas near target animals. On one day a shooter waited ~1 hour for two visitors to leave an area directly behind a target animal. This was the only incident in which visitors disregarded staff requests in regards to the boostering program.

Program Costs

The minimum expended for the 2000 contraceptive program was $12,924 or $308 per boostered animal (Table 2). Recurring supply costs are few and consist mainly of contraceptive drugs. The bulk (80%) of total program costs consisted of PORE personnel hours. The minimum cost of the 2000 contraceptive season without volunteer help would have been $18, 883 or $450 per animal (estimating the value of trained volunteer horse handlers at $20/hour). Volunteer assistance at the current level (~ 300 hours of donated time) decreased the cost of this year's program by 32%.

The total time spent by elk management staff (MFM and NG) was approximately 50 eight-hour days or ~ 400 hours. Should one staff member assume full responsibility for all the darting in the future, darting would have to begin in June to allow for 10 weeks of full time darting before the end of August.

Conclusion and Recommendations

This year's contraceptive program at Tomales Point was successful in boostering 43 elk cows with no human or equine accidents and few elk injuries. The attached protocol (Appendix 1) outlines the method which maximizes darting success.

Staffing Needs:

The boostering program is labor-intensive, requiring long days for staff, horses and volunteers. These long days contribute to fatigue for darting team members and could potentially result in errors and injuries. It is recommended that a high pace of darting be maintained, especially at the beginning of the season, to dart the maximum number of targets before the elk learn to avoid the teams. However, no single team member should work more than 4 days a week. If the contraceptive program is to be continued next year, consideration should be given to hiring a seasonal or temporary employee (GS-5 or 7), skilled in accurate and safe use of firearms, with knowledge of animal capture and immobilization techniques. This employee could work full time from June until the end of August, darting and managing the contraceptive database. Proficiency in reading the elk collars and use of radio telemetry equipment would require at least 2 weeks of field training by other elk staff and interns. The boostering program should begin earlier next

year, in early to mid June, in order to avoid some of the disruption caused by intensified rut activity during the month of August.

Supply Needs :

More doses (~50% more than the number of target animals) of pZP should be ordered in future years than were ordered this year. Doses are lost in missed shots and because loaded darts cannot be reused on a subsequent day. If the Humane Society of the U.S. does not donate pZP next year, the cost of required pZP and adjuvant will be approximately $1,600. The two RM dart rifles are in fair condition, with one requiring repair to the safety catch. Should either or both rifles require replacement, the cost of a new Dan-Inject rifle would be approximately $1,800.

Horse Needs:

A significant amount of time and numerous doses of pZP were wasted this year because of difficulty finding a horse that would tolerate close proximity to both the dart rifle and the elk. PORE should consider purchasing two horses, adequately trained with firearms and amenable to use on the elk range. At the present time, only one horse at the Morgan Horse Ranch can be used for darting and is not 100% reliable.

Two volunteer riders, Matt Martin and Frank Binney, together accounted for ~70% of the donated volunteer hours and contributed ~$4000 in man-hours to the project. Any management decisions that would result in a decrease in the number of available rider-volunteers at the Morgan Horse Ranch or in the elk program would negatively impact the contraceptive program.

Darting and Safety Needs:

The rate of abscess formation, lameness or other injury in darted animals is low but could be decreased by avoiding:
-shots taken at >35 meters,
-shots taken in high wind or on a slope
-shots taken at an angle other than 90 degrees to the target,
-repeated use of disposable drug mixing needles
-non-sterile dart needles.
Difficult shots will always arise in field darting situations and pressure to take these shots increases when shooters are fatigued, the darting process is slower than expected, the horse is not providing adequate cover or pressure exists not to "waste" drug-filled darts. If shooters are not overworked, the darting season begins in June, horses are specifically trained and sufficient extra doses of pZP are ordered, some of these concerns can be alleviated. A large stock of disposable needles and disinfectant should also be purchased and maintained. Sterility of dart needles and aseptic handling of darts are both impossible in the field, however, use of Furacin® or another antimicrobial in the Chapstick® smeared on the end of the dart may help reduce infection. Keeping darts in clean containers prior to use is also important.

N. Gates
09/14/00

The current contraceptive boostering program will become more expensive and less efficient each year. The reasons for this are:

1. Elk collars are aging, with flaking, dirty color bands, and they are becoming more difficult to read. Not all collared animals were ear-tagged at the time of capture. The collar radio signals that darting teams depend on to locate animals, especially at the end of the season, will cease to be transmitted in 2-4 years when the transmitter batteries expire.
2. Elk cows, particularly those that have been darted regularly each summer, are becoming more wary of people and horses. It was frequently the case this summer that the first animal to leave the herd when approached by a darting team was a target animal.
3. Target animals are aging and nearing the end of their reproductive careers. With each passing year, it is more likely that a darted animal would not have become pregnant even without the contraceptive booster. Thus, in a cost-benefit analysis, the efficiency of targeting these animals for contraception is decreasing.

If the contraceptive program continues to be a component of the tule elk management plan at Tomales Point, consideration should be given to capturing and collaring a new group of cows in the next 2-4 years.

Conclusion

Regardless of whether new elk cows are to be contracepted, the boostering program should be reviewed on a yearly basis. The biological parameters of herd population growth and measured elk effects on the ecosystem should be evaluated along with program costs, program safety and the projected population effects of the contraception regimen at Tomales Point.

Table 1: List of Tomales Point Elk Boostered 2000

9/13/00

Collar	Treatment 2000	Recovery Anim	2000 Date	2000 Darter	2000 Dart Site	2000 Dart Dose
BBO	PZP + FIA	☐	7/12/00	MFM	R HIND	FULL (65 UG)
BOG	PZP + FIA	☐	8/23/00	MFM	R HIP	FULL (65 UG)
BOY	PZP + FIA	☐	7/27/00	NBG	L HIP	PROBABLY FULL (65 UG)
BYO	PZP + FIA	☐	8/9/00	MFM	L HIP	FULL (65 UG)
GBO	PZP + FIA	☐	7/11/00	NBG	L RUMP	1/2 DOSE (33 UG)
GGO	PZP DEF + FIA	☐	8/24/00	NBG	R of dorsal midline thoraco-lumbar re	FULL (65 UG)
GOB	PZP + FIA	☐	8/8/00	NBG	R RUMP, HIGH	PROBABLY FULL (65 UG)
GOG	PZP DEF + FIA	☐	8/30/00	MFM	L INSIDE THIGH	FULL (65 UG)
GOO	NO	☑				
GRO	NO	☑				
OBB	PZP + FIA	☐	7/29/00	AG	R THIGH (REAR)	FULL (65 UG)
OBO	PZP + FIA	☐	8/18/00	AG	L RUMP	FULL (65 UG)
OBR	NO	☑				
OBY	PZP + FIA	☐	7/13/00	MFM	L RUMP	PROBABLY FULL(65 UG)
OGG	PZP + FIA	☐	7/27/00	NBG	L HIP	FULL (65 UG)
OGO	PZP + FIA	☐	8/2/00	MFM	R HIP	FULL (65 UG)
OGR	PZP + FIA	☐	8/23/00	MFM	L RUMP	FULL (65 UG)
OGY	PZP + FIA	☐	7/25/00	NBG	L THIGH	FULL (65 UG)
OOB	NO	☑				
OOG	NO	☐				
OOO	PZP + FIA	☐	8/10/00	NBG	L RUMP	FULL (65 UG)
OOR	PZP + FIA	☐	7/11/00	MFM	L HIND	FULL (65 UG)
OOY	PZP + FIA	☐	7/13/00	MFM	L LEG - UPPER	FULL (65 UG)
ORB	PZP + FIA	☐	8/16/00	NBG	R RUMP	PROBABLY FULL (65 UG)
ORO	PZP + FIA	☐	8/23/00	MFM	L RUMP	FULL (65 UG)
ORR	PZP + FIA	☐	8/1/00	MFM	R HIP	FULL (65 UG)
ORY	PZP + FIA	☐	7/28/00	NBG	R HIP	FULL (65 UG)
OYB	NO	☐				
OYO	PZP + FIA	☐	7/12/00	MFM	L RUMP	PROBABLY FULL (65 UG)
OYR	UNKNOWN PZP + FIA	☐	7/25/00	NBG	L HIP	UNKNOWN -DID NOT SEE DART HIT
OYY	UNKNOWN PZP DEF + FI	☐	8/31/00	MFM	UNKNOWN - PROBABLY LEFT RU	UNKNOWN - DID NOT SEE DART HIT
RBO	PZP DEF + FIA	☐	7/17/00	MFM	R HIND - BIT HIGH	FULL (65 UG)
RGO	PZP + FIA	☐	8/11/00	MFM	L SIDE - JUST FORWARD OF HIP	FULL (65 UG)
ROG	PZP + FIA	☑	7/1/00	NBG AND MF	R HIP AND L STIFLE	SHOT TWICE ACCIDENT (130 UG)
ROO	PZP + FIA	☐	8/2/00	MFM	R HIND LEG (UPPER)	FULL (65 UG)
ROY	PZP + FIA	☐	8/10/00	NBG	L RUMP	FULL (65 UG)
RRO	NO	☑				
RYO	PZP DEF + FIA	☐	8/24/00	NBG	R THIGH	FULL (65 UG)

Collar	Treatment 2000	Recovery Anim	2000 Date	2000 Darter	2000 Dart Site	2000 Dart Dose
WOY	PZP + FIA	☐	8/17/00	MFM	R HIND	FULL (65 UG)
WYY	PZP + FIA	☐	8/15/00	MFM	L HIND	FULL (65 UG)
YBO	PZP + FIA	☐	7/11/00	MFM	R HIND	PROBABLY FULL (65 UG)
YGO	PZP DEF + FIA	☐	8/31/00	MFM	L HIP	PROBABLY FULL (65 UG) HIT BONE
YOB	PZP DEF + FIA	☐	7/17/00	MFM	R RUMP	FULL (65 UG)
YOO	PZP DEF + FIA	☐	7/20/00	MFM	L RUMP	PROBABLY FULL (65 UG)
YOR	PZP + FIA	☐	8/4/00	NBG	R HOCK (POINT OF)	UNKNOWN
YOW	PZP+ FIA	☐	8/22/00	MFM	R HIP	FULL (65 UG)
YOY	PZP + FIA	☐	7/29/00	AG	R THIGH	FULL (65 UG)
YRO	PZP + FIA	☐	7/12/00	MFM	R SIDE- JUST FORWARD OF HIP	PROBABLY FULL (65 UG)
YWO	PZP + FIA	☐	7/28/00	WS	R HIP (MAYBE NEAR ABDOMEN)	PROBABLY FULL (65 UG)
YYO	PZP DEF + FIA	☐	8/25/00	MFM	L SIDE JUST FORWARD OF HIP	PROBABLY FULL (65 UG)
ORG	NO	☐				

Table 2: Contraception Expenses - FY 2000

	Days	Hours	$
Personnel			
Natalie Gates	20.5	164	3718
Maura Fallon-McKnight	30.8	246	3769
Bill Shook	2.5	20	589
Joan Zeleny	9.0	72	1155
Kacy Kobrin	1.0	8	99
Suzy Pettit	1.4	11	169
Angelina Gregorio	5.0	40	749
Harold Geritz	3.8	30	597
Mark Yeston	0.3	2	40
Karen Frasier	0.3	2	40
Steve Stinnett	0.3	2	40
Mike Baldree	0.3	2	40
Total	74.9	599	10256
Supplies			
One-time (optics, CO2 pistol)			835
Recurring (charges, darts, drugs etc.)			1500
Total			2335
Vehicles			
4-WD	25.0		333
Volunteer Personnel			
Matt Martin	12.5	100	2000
Frank Binney	12.5	100	2000
Cynthia	2.4	19	380
Osborne Howes	1.1	9	180
Ben Stone	3.8	30	600
U.C. Davis staff	5.0	40	800
Total	37.3	298	5960

Total 2000 Program Cost	**18884**
Total Expended	**12924**
Cost expended per boostered animal	**308**
Cost per boostered animal without volunteers	**450**

Appendix 1: Contraceptive Boostering Protocol
Tomales Point

Daily Preparation

Darting personnel will be responsible for daily preparations each morning before darting operations begin. This means gathering all the gear, drugs, and guns that will be used that day.

Daily Checklist:
Guns, magazines, charges, darts, pZP and adjuvant, needles, syringes, chapstick with Furacin® powder, rangefinders, binoculars, King radios, revised target list, armbands ("wrist coaches"), data sheets, ice packs, cooler, practice target.

Note: yellow darts are pneumatic darts for the Dan-inject pistol. Orange darts are charge darts for the Pneu Dart rifle.

Target Lists

Each day an updated target list of animals to be boostered should be placed in the armbands for the darter and horse riders to use. The target list should include: animal collar colors, frequency, A/B day, and eartag numbers. After an animal is darted in the field, they should be immediately crossed off the list.

Dart guns

Pneu Dart rifles

There are two Pneu Dart rifles in the basement of the Resource Management building. Both practice and real darts for these rifles are orange and have a "C" on the side. Power charges used in the rifles are color coded to identify the strength of the charge. Use green charges for darting elk, with the rifle set on # 3. Rifles can be accurately fired at distances from 20-50 meters.

Dan Inject pistol

There is one Dan Inject pistol in the basement of the RM building. Pneu Dart brand practice darts for the pistol are orange with a "P" on the side and the real Pneu Dart brand darts are yellow. In order to use Pneu Dart brand darts with the Dan Inject pistol, the 13-mm. barrel must be used. The 11-mm. barrel will only fire Dan Inject reusable darts, which have proven unreliable with pZP. The pistol uses CO_2 cartridges and the pressurized air can be altered for each shot. For distances of roughly 30 meters, the pressure dial should read 6. The Dan Inject pistol can only be accurately fired at distances of less than 30 meters.

It may be fired from horseback on certain horses that will tolerate it. The rifles may not be fired from horseback.

The darter can take practice shots the morning of the darting at the horse ranch, or at Upper Pierce Ranch at Tomales Point (if a safe location is identified). Guns should be sighted in correctly and kept clean at all times. Cleaning supplies are in the basement of the Resource Management building.

Gun safety

Guns should be unloaded, safety on, and carried inside a carrying case at all times while in a vehicle. Gun should be unloaded with safety on when on horseback and while hiking long distances. Darts can be loaded just before approaching a target group of animals. Be aware of horses and other team members while in the field. Do not point the muzzle of the gun in their direction. Never take shots in the direction of Tomales Point Trail unless you have secured the area. It is possible to have horse handlers close off portions of the trail and hold hikers back while taking a shot near the trail. Be sure that there is a good backstop for each shot.

Composition of darting teams

Each team should consist of a minimum of two people and one horse. The darter can be on foot and one person should be riding. If teams will be working at the north end of Tomales point, it is sometimes useful to have 3-person teams. In this case, all 3 members (1 shooter and two horse handlers) will ride all the way to the north end. The extra horse person is responsible for holding their own horse and that of the shooter while the actual darting is taking place. It is best to have this handler hold the horses out of sight of the target group of elk. It sometimes makes the elk jumpy to have a team approaching them with horses moving around in the distance.

It is ideal to have two darting teams working at Tomales Point each day. One team can work in the north end, and the other team can stay in the south. The two teams should try to work as far away from each other as possible, and maintain radio contact throughout the day.

Toward the end of the darting season it will become more difficult to find target animals. During this period it is helpful to have 3-person teams with a horse – holder (even in the south end), so that the teams can cover more ground each day.

Drug Storage

The pZP will be delivered frozen in single dose vials. All vials should remain frozen until use. The adjuvant must remain refrigerated until use. Blue ice packs should be used in the field to keep both the pZP and adjuvant cold during the day. Another option is to keep pZP doses on dry ice in the field

and then if you do not use doses they remain frozen the entire time. The closest source of dry ice is in San Rafael.

Doses of pZP that are defrosted while in the field, but not used, should be placed in the refrigerator at the end of the day. Please mark these defrosted vials with permanent pen so they will be used first the next day. These refrigerated doses should be used within 3 or 4 days of defrosting and should not be refrozen.

Drug Preparation

The number of pZP doses you bring in the field depends on the number of teams working each day. It is recommended that each team bring out four doses a day during the beginning of the darting. You will dart more animals per day in the beginning because targets are easier to find and the animals are less wary of the teams.

You can mix up one dart in the morning once you arrive at Tomales Point, and then mix up additional darts as you need them throughout the day. Do not mix up all doses in the morning because you may not use them all. Once the pZP has been mixed with the adjuvant, and loaded into the dart, it must be used that day or discarded. An unfired dart contains a charge and should be fired at a practice target or safe backstop.

To mix up a dart: Defrost the dose of pZP by warming it in your hand. Next, draw up .5 cc Adjuvant into the glass syringe and draw up the dose of pZP into the same syringe. Remove the needle from the syringe, and attach the syringe to another glass syringe with the plastic connector. Push the pZP mixture back and forth through both syringes about 100 times (varies with ambient temperature), or until the mixture has the consistency of butter cream frosting. Push all the mixture into one syringe and remove the empty syringe with the connector on it. Put the same needle back on the syringe and insert needle all the way into the empty dart (point away from you). Slowly push mixture into dart. Put a plug of chapstick (with Furacin® powder mixed in it) on the tip of the dart to keep drug from leaking out. Always carry loaded darts in a secure container (point side up). The plastic package darts come in is perfect for carrying darts in the field.

You may make enough mixture for two darts at once by pulling up 1 cc of adjuvant and 2 doses of pZP.

You must bring the drugs, darts, and drug mixing syringes (in a protective case) along with you in the horse saddlebags, so you can mix darts in the field.

Identifying target elk

Many of the Tomales Point female elk have radio collars around their necks. These collars have color codes on each side. Each collar I.D. consists of three colors (a combination of white, blue, green, red, yellow and orange). The same color pattern is on each side of the collar. Collars are read from top down

(from the antenna to the battery box). For example, GWR is green, white, red. Many of the collars are old and faded, and some color patches have fallen off. It takes some practice to be able to read them.

All of the target animals for boostering have orange on their collars (with the exception WYY). Unfortunately, orange fades quickly, so many orange patches appear pink or whitish. For difficult collars, the darter may attempt to read the eartags of an animal for confirmation. Some animals have no eartags, so the darter will have to make a call as to whether or not the animal should be shot. Radio telemetry can also be used to identify an animal if her collar is "on" that day.

Finding target animals

At the beginning of the darting season, it is possible to ride up to groups of elk and read all the collars in the group with binoculars. You will find most of your targets in this manner. Later, when there are fewer targets left, it is necessary to use the radio receiver and antenna to locate target animals.

Darting target animals

When you have found a target, you should load the gun with a dart and be sure you have a power charge loaded. Keep the gun safety on until right before you shoot. At this point the shooter should hide behind the horse's rump and begin "stalking" the animal. The horse and shooter need to approach very slowly in order not to spook the elk. It is best if the horse is relaxed and grazing during the approach – this relaxes the elk. The shooter should try to approach within 35 meters of the target animal, although shots can be taken from further away (up to 45m.). Shots from long distances are less likely to be accurate. The rider should have a rangefinder, and can tell the shooter when the target is within range. The shooter can also wear a rangefinder so she/he can judge the shooting distance if the horse leaves her/him in a bush for a "surprise" shot.

When the shooter is within range, he/she should notify the rider when ready to take a shot. If the horse is not spooked by the noise of the rifle (Rhed), you can take shots from just behind or just in front of the horse. With horses that are more afraid of the gun (Huck), the shooter gets in position and allows the horse to walk away about five or ten meters before taking the shot. In this case, it is best to give the horse a carrot as a reward after each shot. If the shooter is the one who gives the horse a carrot, it makes the horse less afraid of the gun.

The shooter and rider should both try to watch the dart hit the animal, and determine where the animal was hit. In addition, the shooter should either take a compass bearing in the direction of the shot (after the shot), or at least put a hat or other marker down pointing in the general direction of the shot.

All fired darts should be retrieved, if at all possible. If you determined the range before you fired, and took a compass bearing, it will assist you in finding the dart. While looking for the dart, place a colored flag in the spot where the

shot was taken, so you don't forget where it was. Sometimes the person on horseback can spot the darts easier than the darter on foot. If there is more than one target in a group, and you want to take another shot before finding the last dart, mark the shooting spot with a flag and record the range and compass bearing of the shot. You can find this dart later. It is recommended that every effort be made to retrieve darts. A good rule of thumb is to spend at least one hour per dart searching in a grid pattern.

To check whether or not a dart actually discharged, insert a narrow blade of dry grass into the needle (point away from you). If the grass only goes as deep as the needle hub, the dart is discharged. If the grass goes further than the length of the needle, into the orange part of the dart, then it didn't fire. You will see a lot of pZP on the blade of grass if it didn't discharge. Do not reuse fired darts – even if they didn't discharge. These darts must be fired at a Styrofoam target later before they are disposed of. Do not dispose of "hot" darts that did not discharge.

NOTE: If there is wind in the area, try to shoot with the wind at your back so the dart travels in a straight line.

NOTE: shooting uphill/downhill on steep slopes or in windy conditions is not recommended – the darts do not travel well in these situations.

Recording data

The darter should keep accurate records while in the field. The following information should be recorded for each darted animal: date, darter initials, rider initials, animal collar color, site of injection, distance of shot, was dart retrieved?, full or partial dose, location of elk, was a calf seen with the elk (nursing or grooming)?. It is easiest to record this data in a small notebook then transfer it to a data sheet at the end of the day. A sketch of where the dart hit the body of the elk is very useful on the data sheet.

Radio Procedures

During darting operations it is important to stay in contact with members of your team, and other teams. If you are within sight of the person you would like to contact, use channel 4 (special use). This is a secure channel so other park personnel will not hear your transmission. If you cannot make contact using channel 4, then try channel 2 (Lighthouse), or channel 3 (Barnaby). Channels 2 and 3 are park-wide channels that everyone can listen to. Make these transmissions brief and use proper radio language.

End of day duties

After making sure the horses are clean and put away, the darter will be responsible for cleaning the drug mixing equipment. Needles will be disposed of (in sharps container) and replaced with new ones for the next day. Syringes should be rinsed out with hot water and then finally with rubbing alcohol. Once dry, syringes, needles and chapstick should be placed back into the cardboard tube.

Fired darts should be disposed of in the sharps container only if they were discharged.

Dart rifles should be cleaned (if needed) and stored in a secure gun locker.

Unused pZP should be refrigerated for use the next day (mark these doses so they will be used first the next day).

Adjuvant should be placed in the refrigerator.

Horse use

The darter will be responsible for organizing horse use for the days they are going out. If the darter is going to ride, she/he must prepare a horse in the morning and help clean the horses and trailer at the end of the day. Park employees must wear helmets while riding. Harold Geritz will make decisions about which horses will be used, and how they should be used. All riders must defer to Harold regarding how the horses should be handled.

Radio harnesses, saddlebags, and helmets are stored up at the horse ranch. This equipment will be used each day during the darting. Drugs, drug mixing equipment, and flags, should be carried in the saddlebag of the horse that will actually be approaching the elk. This way, the darter can reload a dart while they are in close proximity to the elk, if the need arises.

Informing the public

A sign has been created to post at the trailhead of the Tomales Point Trail, notifying hikers of the contraceptive boostering program. Be sure this sign is posted at the beginning of the season. You might want to notify 799 (dispatch) about which days of the week boostering will occur.

Hikers often stop you on the trail and ask about the project. Please take the time to answer all questions from the public. This is a great opportunity to educate park visitors.